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How the "Laws of Chance" Affect You

> *No theory of chance can explain the creation of the world. Before chance can send atoms whirling through infinite void, the atoms have to exist! What has to be explained is the being of the world and matter. It makes no sense to say that chance can account for the creation of being.*[1]
>
> —Claude Tresmontant, University of Paris

MATERIALISTS USUALLY DO not stop to consider that naturalistic philosophy cannot satisfactorily explain the very existence of being—of atoms or anything else. This is a serious flaw.

For the purpose of this study, however, we will start with the earth and the universe already existing. Logic may lead us to the conclusion that evolution is not a tenable way to explain how things got "from there to here," from nonliving to living complexity.

The Path We Will Take

The approach to be followed to this valuable certainty is this: First, it is important to understand clearly two of the main ideas of probability theory, the "laws of chance." This can be done in a comparatively short time with the help of information in this chapter and the next. Then we will see how these "laws" serve to limit what can be expected to happen by chance, regardless of what other natural laws are invoked.

Could molecules link up and organize themselves to form

[1] Claude Tresmontant, "It Is Easier to Prove the Existence of God Than It Used to Be," *Réalités* (Paris, April, 1967), p. 46.

living things without planning? Could matter in motion bring about the array now existing without an Intelligence directing its formation? It will be exciting to apply these laws of chance to the formation of protein molecules, for example, and eventually to genes of the amazing DNA molecule itself!

If we ask: Does any intelligent person actually suppose that chance does account for what we now find existing on earth? Strange to say, the answer is yes. It is a very widespread belief. To say that chance plus "natural selection" has done it is the same as to say chance has performed it. Natural selection involves no outside intelligence, but is merely the natural process which weeds out those organisms which are not sufficiently equipped to survive and reproduce. When we look into this process in chapter 5, we will find it has been greatly overrated. Natural selection as presently understood by most evolutionists in the United States can use only what is furnished to it by chance or random occurrences.

Chance is still the original hero of the story on which all else must wait.[2] Most evolutionists are reluctant to say this directly, however. (It should be remembered that the word evolution, as we are using it, indicates the idea that life arose from nonliving matter and has reached its present state without the direction of any outside intelligence.)

It is currently quite common for scientists to attempt "to explain all biology in terms of physics and chemistry." At least one scientist has endeavored to explain it by physics alone.[3] Later on, it will become clear how there can be intelligent scientists who nevertheless believe, contrary to reason, that all things can be explained "without recourse to a 'deus ex machina,' "[4] without God or any intelligence involved. In the absence of intelligence, chance is all there is as the ultimate source of what happens (outside of unbranched causal chains). We are therefore dealing with the crux of the matter, the heart of evolution, when we study the laws of chance, or probability theory.

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[2] To save time, we will often speak of chance and other natural processes in this anthropomorphic (as-if-human) sense. Although it is not scientific wording, it is easy to understand, like the nonscientific term "sunrise."

[3] Dean E. Wooldridge, *Mechanical Man* (New York: McGraw-Hill, 1968).

[4] Murray Eden, "Inadequacies of Neo-Darwinian Evolution as a Scientific Theory," *Mathematical Challenges to the Neo-Darwinian Interpretation of the Theory of Evolution*, ed. Paul S. Moorhead and Martin M. Kaplan (Philadelphia: Wistar Institute Press, 1967), p. 5. Dr. Eden does not indicate whether he agrees with this materialistic idea.

Probability is a practical concept. The uncertainties of chance affect our everyday lives. How likely is it to rain on the particular day on which you've planned to have an outdoor activity? What are the odds your airline flight will be hijacked? Is there a good chance your car will operate without major repairs if you delay trade-in for six months? What amount of cash will probably be sufficient to take along on a planned overseas trip? What is the likelihood that you will pass a certain exam in a school course without more study?

Besides personal planning in which we must consider uncertainties, "probability and statistics are used in insurance, physics, genetics, biology, business, as well as in games of chance," and as the basis of analysis of the stock market, intelligence tests, and much of modern mathematics, as the authors of *Pathways to Probability* remind us.[5] Modern factory production relies on a "quality control department engaged in applying statistical method, which is in the main a use of probability theory."[6] An airliner in which you travel may change course, depending on the *probability* of clear air turbulence as indicated by satellite reports.

By the way, it perhaps is already clear to the reader that the "laws" of chance are not laws in the deterministic sense. The laws of probability do not say that things must necessarily happen in a certain way, but that on the average that is the way things occur. John P. Hoyt explained this well. In some experiments such as observing the time of sunrise, he said, the outcome can be predicted accurately. He adds:

> There are many other experiments in many diverse fields whose outcomes cannot be predicted accurately in advance. Even if the same experiment is repeated again and again under what seem to be the same conditions, the outcomes vary in such a way that they cannot be predicted precisely before the conclusion of the experiment. However, if the same experiment is repeated many times, we often see a certain regularity in the relative frequency with which different possible outcomes actually occur. It is this type of experiment that led to the development of probability theory and to which this theory can be applied.[7]

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[5] Amy C. King and Cecil B. Read, *Pathways to Probability* (New York: Holt, Rinehart & Winston, 1963), pp. 30, 130.

[6] Darrell Huff and Irving Geis, *How To Take a Chance* (New York: W. W. Norton & Co., 1959), p. 113.

[7] John P. Hoyt, *A Brief Introduction to Probability Theory* (Scranton, Pa.: International Textbook Co., 1967), p. 1.

Who Figured Out the Laws of Chance?

Rather than leave important matters to mere guesswork and complete uncertainty, many brilliant thinkers have investigated this subject from the time of the Renaissance on. One of the first to delve deeply into probability was Blaise Pascal, the famous French mathematician, scientist, and theologian of the seventeenth century. It was not considered unusual for a man to be proficient in both science and theology in those days. Many of the early scientific discoveries were by clerics and many were by devout nonclerical believers.

There is something of a resurgence of that today, in the case of men like Claude Tresmontant. In his early forties at present, Dr. Tresmontant lectures at the Sorbonne in Paris on the philosophy of science. He also has written highly regarded works on theology, such as his *Christian Metaphysics* (1965).[8] Dr. James Whitcomb, Jr., was at the same time a professor of Old Testament at Grace Theological Seminary and coauthor of an exhaustive geological investigation. The resulting book, *The Genesis Flood*,[9] is the epitome of scholarly and scientific thoroughness. There are scores of similar instances.

It is questionable if modern science could have attained nearly as great a degree of knowledge and accomplishment if it had not been for devout Christian scholars of earlier centuries, men who marveled at the Creator's wisdom as they peered scientifically through early microscopes and telescopes, just as some scientists with far more complex and sophisticated instruments marvel today.

After Pascal, Jakob Bernoulli, a Swiss mathematician, further developed the study of chance. He can be regarded as the founder of probability theory as a branch of mathematics.[10] He saw it as "The Art of Conjecture."[11] The resulting principles were put to practical use. Life insurance rates, for one example, have been based on probability theory from early times.

Probability Theory in Modern Physics

The science of physics has been responsible for much more study of probability in this century. Danish physicist Niels Bohr

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[8] Claude Tresmontant, *Christian Metaphysics* (New York: Sheed and Ward, 1965).

[9] John C. Whitcomb Jr., and Henry M. Morris, *The Genesis Flood* (Philadelphia: Presbyterian and Reformed Publishing Co., 1960).

[10] *Encyclopaedia Britannica* (1967), s.v. "probability."

[11] Huff, *How to Take a Chance*, p. 57.

in 1913 brought forth some of his epic conclusions regarding the nature of the atom. He built on work done some years before by Max Planck in Germany. Planck had written of the "quanta"—or amounts—of energy given off and absorbed by atoms.[12]

These and other discoveries were culminated in 1926 by the appearance of the full-fledged theory of "quantum mechanics." This refers to the rules which govern phenomena that are so small-scale that they cannot be explained by ordinary mechanical laws.

In this exceedingly complex field, probability theory found its greatest development. In many situations where the behavior of atomic particles seemed purely arbitrary and random, the statistical laws of probability furnished the only "order." By the middle of the twentieth century, "the concept of probability had become one of the fundamental notions of a modern science and philosophy of nature."[13]

The need for carefully investigated principles of probability has yielded many books on the subject. Your public or school library doubtless has a number of them. Averages and formulas have been worked out in great detail and are extremely trustworthy. Skyscrapers are built and moon expeditions are launched as a result of engineering that depends on these laws. Stores decide how many goods to stock, plane schedules are made up, traffic signals are timed, and city planning is accomplished—all with the help of probability theory.

Books on Probability

Books in this field can be very confusing to those who have not been carefully educated in higher mathematics. There are actually hundreds of volumes. Pick a book at random on the subject, and, chances are, it will take a lot of long, ardent cogitation, study and restudy, before one can make heads or tails of it, unless he is a mathematician or already trained in probability theory. Many writers on probability seem to take for granted that the reader knows a lot about it from the start.

There are several books which are not quite as difficult as the many ultratechnical volumes. One of the best is *Probability*

[12] David Bohm, *Causality and Chance in Modern Physics* (Princeton, N. J.: D. Van Nostrand Co., Inc., 1957), p. 72.
[13] *Encyclopaedia Britannica,* op. cit., p. 571.

and Statistics.[14] It was the textbook for a television course called "Continental Classroom." Another is Warren Weaver's *Lady Luck: Theory of Probability.*[15] A third is *Probability and Statistics for Everyman,* by Irving Adler.[16]

In books on probability, code words that mean little to anyone who has not taken math recently are used—including expressions such as "N-tuples," "sample space," and "the empty set." We need not become involved in technical terms here. It can occupy a tremendous amount of time to become proficient in the use of the mysterious terminology of advanced mathematics.

The main principles needed for our purpose in this study are rather simple, in contrast to the complexity of books on the subject. Enough will be given in this chapter and in subsequent pages for one to grasp the basic ideas. To go into advanced probability theory is completely unnecessary unless one needs it for other reasons. The first few chapters of books like those mentioned offer additional understanding for those who wish to pursue the subject further. Beyond those early chapters, the strange symbols and complex formulas of this form of higher mathematics tend to develop suicidal tendencies in the nonprofessional.

Are the Laws of Chance Intuitive?

"Chance is a characteristic feature of the universe," said Adler.[17] We are better equipped for life's decisions if we understand this subject to some degree.

The principles of probability are in many respects just what one would expect in any given situation. He flips a coin, and feels that logically he has a fifty-fifty chance of getting heads. Quoting again from *Pathways to Probability:*

> We are inclined to agree with P. S. Laplace who said: "We see . . . that the theory of probabilities is at bottom only common sense reduced to calculation; it makes us appreciate with exactitude what reasonable minds feel by a sort of instinct, often without being able to account for it."[18]

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[14] Frederick Mostellar, Robert E. K. Rourke, and George B. Thomas, *Probability and Statistics* (Reading, Pa.: Addison-Wesley Publishing Co., 1961).
[15] Warren Weaver, *Lady Luck: Theory of Probability* (New York: Doubleday, Garden City, 1963).
[16] Irving Adler, *Probability and Statistics for Everyman* (New York: John Day Co., 1963).
[17] Ibid., p. 11.
[18] King and Read, *Pathways to Probability,* p. 130.

We will mention briefly that much study into the *meaning* of the principles of probability has been done. This study has had an impact on science and philosophy and the general understanding of the nature of things. C. S. Lewis once wrote an interesting chapter on probability in which he said, "According to Hume, probability rests on what may be called the majority vote of our past experiences." In a penetrating study of the deeper meaning of the subject, Lewis, one of the most profound thinkers of this century, went on to say,

> The whole idea of Probability (as Hume understands it) depends on the principle of the Uniformity of Nature.... And how do we know the Uniformity of Nature? A moment's thought shows that we do not know it by experience.... Experience therefore cannot prove uniformity, because uniformity has to be assumed before experience proves anything.[19]

For our study here, however, there is no need to dig any deeper into this facet of probability. We will be dealing with the world of nature as evolutionists see it. The laws of chance will be applied to that assumed world to see if things could logically have turned out as they now are on the basis of that theory. In doing this, we will proceed on their own assumption that the uniformity of nature is true, keeping in mind that it is an assumption.

When Probability Does Not Apply

There are areas in which chance has little to do. We have seen that it is not involved when specific outcomes can be precisely predicted. Also, situations in which there is advance purpose are generally not a field for applying probability theory. Neither are cases where there are known chains of cause-and-effect. When you flip a light switch, the bulb lights up. This does not ordinarily involve probability.

It is a different story if we consider the case in which a light goes out because a tree accidentally falls across the power line somewhere. Although cause and effect are involved, we cannot trace the exact sequence, and we don't consider that anyone

[19] C. S. Lewis, *Miracles, A Preliminary Study* (New York: Macmillan, 1947), pp. 104, 105.
If you are interested in the philosophic meaning, we highly recommend Lewis' study "On Probability" in this perceptive little book. Lewis was an Oxford University professor and a prolific author.

purposed or caused the tree's fall at that particular instant. There is no way to figure out in advance when and where such a thing will happen. From our human point of observation, we say it happened "by chance" to occur at that time and place.

Another example is the number of cars passing a particular point on the street in a ten-minute interval. Traffic engineers must plan streets and signals, and are concerned with such facts. Although each car has its own chain of cause-and-effect as to why the driver happened by at that moment, it is obviously not possible to predict with certainty the exact number of cars that will pass that point. There are too many factors involved that cannot be ascertained. It is not a situation in which the traffic engineer can see a clearly discernible chain which reads: this-cause-produces-this-effect. He therefore must use probability reasoning that is ultimately based on past experience and uniformity.

It Is Proper to Apply Probability Theory to Evolution

Probability theory is primarily involved when (1) there is believed to be no intelligent planning and (2) a cause-and-effect chain is not decipherable because the "causes are too complex to permit prediction."[20]

Harold J. Morowitz, Professor of Biophysics at Yale University, wrote:

> Often a process is so complicated or we are so ignorant of the boundary conditions, or of the laws governing the process, that we are unable to predict the result of the process in any but a statistical fashion. . . . Randomness is in a certain sense a consequence of the ignorance of the observer, yet randomness itself displays certain properties which have been turned into powerful tools in the study of the behavior of systems of atoms.[21]

Evolution is an ideal subject in which to apply the laws of chance. As defined earlier, evolutionary doctrine denies advance planning, and has random matter-in-motion as its basic causal source. "Chance mutations" furnish the variability upon which

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[20] Émile Borel, *Probabilities and Life* (New York: Dover Publications, Inc., 1962), p. 1. On the same page, Borel says, "The principles on which the calculus of probabilities is based are extremely simple and as intuitive as the reasonings which lead an accountant through his operations."

[21] Harold J. Morowitz, *Entropy for Biologists* (New York: Academic Press, 1970), pp. 64, 65.

presently accepted evolutionary thinking in America is generally founded.

A central question we will be investigating is this: Do the laws of chance allow one to consider evolution as being within the realm of conceivable probability?

Probability—Not Always What One Would Expect

In tossing a coin, our intuition was right. There is one chance in two that heads will result. There are other situations where probability does *not* turn out as we might suppose. That is why it is important to study the principles of chance. Then we will be more likely to guess correctly in casual thought. Here is a case where most people guess wrong:

Suppose we have ten similar coins and number them one through ten. We put them in a container and shake them thoroughly. If we draw out one without looking, we naturally expect that we have a one-out-of-ten chance of getting the number one coin first. In that, our intuition is correct. Each coin is "equally likely" to be chosen at random. The probability is therefore 1/10. In this experiment, each time we will return the coin after drawing it, so there will always be a complete set. This is called drawing "with replacement."

Now, suppose we start over from the beginning and ask what the chances are of getting the number one coin on the first try followed by the number two coin on the next try. To many people, it seems it should be one in twenty. The truth is, however, that there is only one chance in one hundred of getting those two in order. If this is hard to accept, don't be surprised; you are not alone in such an impression. This is an important step in progress toward certainty on our main subject; so it will be worthwhile to examine thoroughly the rule involved here. Before discussing this further, it may be noted that one can find out by actual trial that this is correct.

Prove It to Yourself So You May Be Sure

It was mentioned earlier that this approach is susceptible to your own verification. You can perform easy experiments privately or with others, drawing coins or other numbered objects, to find out if chance really follows these rules. The time involved in brief experiments may be worth a lot toward arriving at solid conclusions that satisfy your own desire to be sure. One may follow through to whatever extent desired, to gain firsthand proof

that it really does turn out that way, *on the average.* The next chapter will include important ideas on how to make experiments scientific and how to make them yield the most information in a short time by using fewer than ten from which to draw.